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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
ROSENBERGER, RICHARD A	

ART UNIT	PAPER NUMBER
2877	

DATE MAILED: 02/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/714,257	BEVIS ET AL.	
	Examiner	Art Unit	
	Richard A Rosenberger	2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-64* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *11-52* is/are allowed.

6)☒ Claim(s) *1-10 and 53-64* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

1. Claim 64 is rejected under 35 U.S.C. 112, first and second paragraph, as being not being adequately supported by the specification as filed and as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 64 calls for "selectively activating individual filter elements of an LED filter array". There is no mention for an LED array in the specifications and it is not clear how an LED array can be used as a filter. It appears that this may be an typographical error and what was intended was "LCD array".

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 3, 4, 6, 9,10, and 53 are rejected under 35 U.S.C. 102(b) as being anticipated by Nakata et al (US 5,046,847).

As in independent claim 1, the reference shows, in figure 13A in particular but next exclusively, and particularly but not exclusively in columns 21-23 of the specification, a surface inspection apparatus including, in combination, an illumination source (203a) for directing a light beam onto a workpiece (1) to generate scattered light that includes light scattered from defects of the workpiece and light scattered in accordance with the ordinary scattering pattern of the workpiece; a light detection element (2-dimensional solid state imaging element 208) capable of receiving light and capturing a two-dimensional image of the light and translating the two-dimensional image into an electrical signal; a programmable light selection array (liquid crystal element 247) for receiving light scattered from the workpiece and selectively directing the light scattered from defects of the workpiece onto the photosensor; and processing circuitry (comparing circuit 210) for receiving an electrical signal from the light detection element and using it to conduct surface analysis of the workpiece; the combination comprising a means for detecting defects of the workpiece.

Similarly, in independent claim 4, the reference shows a surface inspection apparatus comprising an illumination source (203a) for directing a light beam onto a workpiece (1) to generate scattered light that includes light scattered from defects of the workpiece and light scattered in accordance with the ordinary scattering pattern of the workpiece; a programmable light selection array (247) positioned to

receive light scattered from the workpiece and selectively direct the light scattered from defects of the workpiece onto a light detection element (208); the light detection element is positioned to receive the light from the programmable light selection array and capable of translating the light into an associated electrical signal; and processing circuitry (210) for receiving the electrical signal and using it to conduct surface analysis of the workpiece.

As in independent claim 53, the reference shows a method for conducting surface inspection comprising: providing a workpiece (1) inspection; illuminating the workpiece (by 203a) to produce scattered light that includes light scattered from defects in the workpiece causing defect scatter and includes light scattered from non-defect portions of the workpiece generating an ordinary scattering pattern of the workpiece; selectively detecting the defect scatter (by 247 and 208 together); and analyzing the selectively detected defect scatter to characterize the workpiece surface (by 210).

As in claims 3, and 9, the programmable light selection array of the reference comprises an array of LCD filter elements that are selectively activated to direct the light scattered form the defects and no the ordinary scattering pattern.

As in claim 6, the reference is a darkfield inspection tool.

As in claim 10, the detector (208), being a 2-dimensional solid state imaging element, comprises at least two photo-sensitive detector elements.

5. Claims 2 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakata et al (US 5,046,847) in view of Goldberg (US 6,366,352).

See the rejection above of claims 1 and 4 over Nakata et al.

Nakata et al does not teach using an array of reflective elements as the light selection array, using a liquid crystal array in transmissive mode.

Goldberg et al, in column 8, line 66 through column 9, line 12, teaches the use of a reflective light selective means in a similar arrangement, and teaches the art-recognized equivalence and substitutability of transmissive and reflective light selection means.

It would have been to use a known reflective light selection means for the light selection array of Nakata et al because, as taught by Goldberg et al, such reflective light selection means are known, known to be useful for such purposes, and known to be usable for such purposes, and is explicitly taught in the art as a substitute for transmissive light selection means.

6. Claims 4, 6, 7, 8, 9, and 53 rejected under 35 U.S.C. 102(b) as being anticipated by Goldberg et al (US 6,366,352).

As in independent claim 4, the reference shows a surface inspection apparatus comprising: an illumination source (4) for directing a light beam onto a workpiece (2) to generate scattered light that includes light scattered from defects of the workpiece and light scattered in accordance with the ordinary scattering pattern of the workpiece; a programmable light selection array (28; see column 8, line 66 through column 9, line 12) positioned to receive light scattered from the workpiece and selectively direct the light scattered from defects of the workpiece onto a light detection element (20); the light detection element is positioned to receive the light from the programmable light selection array and capable of translating the light into an associated electrical signal; and processing circuitry (7) for receiving the electrical signal and using it to conduct surface analysis of the workpiece.

As in claims 53, the reference shows a method for conducting surface inspection comprising: providing a workpiece (2) for inspection; illuminating the workpiece (by 4) to produce scattered light that includes light scattered from defects in the workpiece causing defect scatter and includes light scattered from non-defect portions of the workpiece generating an ordinary scattering pattern of the workpiece; selectively detecting the defect scatter (by 28 and 20 together); and analyzing the selectively detected defect scatter (by 7) to characterize the workpiece surface.

As in claim 6, the system is a darkfield inspection tool.

As in claim 7, the tested wafer may be unpatterned (column 4, line 54).

As in claim 8, the light selection array may comprise an array of reflector elements that are selectively activated to direct the light; see mask assembly 128 in figure 7 , and column 9, lines 8-12.

As in claim 9, the light selection array may comprise an array of filter elements (an LCD array in transmissive mode; see column 9, line 2-7).

7. Claims 4, 6, 7, 9, and 53 are rejected under 35 U.S.C. 102(b) as being anticipated by Vaez-Iravani et al (US 6,201,601).

As in claim 4, the reference shows surface inspection apparatus comprising: an illumination source (52) for directing a light beam onto a workpiece (76) to generate scattered light that includes light scattered from defects of the workpiece and light scattered in accordance with the ordinary scattering pattern of the workpiece; a programmable light selection array (300) positioned to receive light scattered from the workpiece and selectively direct the light scattered from defects of the workpiece onto a light detection element; the light detection element is positioned to receive the light from the programmable light selection array and capable of translating the light into an associated electrical signal; and processing

circuitry (400) for receiving the electrical signal and using it to conduct surface analysis of the workpiece. Note that the element 300 is a programmable (column 11, lines 51-53).

As in claim 53, the reference shows a method for conducting surface inspection comprising: providing a workpiece (76) for inspection; illuminating the workpiece (by 52) to produce scattered light that includes light scattered from defects in the workpiece causing defect scatter and includes light scattered from non-defect portions of the workpiece generating an ordinary scattering pattern of the workpiece; selectively detecting (by 300 and 80) the defect scatter; and analyzing (by 400) the selectively detected defect scatter to characterize the workpiece surface.

As in claim 6, the system is a darkfield inspection tool.

As in claim 7, the tested wafer is unpatterned.

As in claim 9, the liquid crystal embodiment of the reference (column 11, lines 60-67) is an array of selectively activated filter.

8. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vaez-Iravani et al (US 6,201,601) in view of Goldberg (US 6,366,352).

See the rejection above of claim 4 over Vaez-Iravani et al.

Vaez-Iravani et al does not teach using an array of reflective elements as the light selection array, using a liquid crystal array in transmissive mode.

Goldberg et al, in column 8, line 66 through column 9, line 12, teaches the use of a reflective light selection means in a similar arrangement, and teaches the art-recognized equivalence and substitutability of transmissive and reflective light selection means.

It would have been to use a known reflective light selection means for the light selection array of Vaez-Iravani et al because, as taught by Goldberg et al, such reflective light selection means are known, known to be useful for such purposes, and known to be usable for such purposes, and is explicitly taught in

9. Claims 1-4, 6, 8-10, 53-60, and 63-64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Danko et al (US 5,659,390).

As in independent claim 1, the reference shows a surface inspection apparatus including, in combination: an illumination source (21) for directing a light beam onto a workpiece to generate scattered light that includes light scattered from defects of the workpiece and light scattered in accordance with the ordinary scattering pattern of the workpiece; a light detection element capable (27) of receiving light and capturing a two-dimensional image of the light and translating the two-dimensional image into an electrical signal; and a programmable light

selection array (23) for receiving light scattered from the workpiece and selectively directing the light scattered from defects of the workpiece onto the photosensor.

As in independent claim 4, the reference shows a surface inspection apparatus comprising: an illumination source (21) for directing a light beam onto a workpiece to generate scattered light that includes light scattered from defects of the workpiece and light scattered in accordance with the ordinary scattering pattern of the workpiece; and a programmable light selection array (23) positioned to receive light scattered from the workpiece and selectively direct the light scattered from defects of the workpiece onto a light detection element; the light detection element is positioned to receive the light from the programmable light selection array and capable of translating the light into an associated electrical signal.

As in independent claim 53, the reference, in figure 4 for example, shows a method for conducting surface inspection comprising: providing a workpiece (13) for inspection; illuminating the workpiece (by 83) to produce scattered light that includes light scattered from defects in the workpiece causing defect scatter and includes light scattered from non-defect portions of the workpiece generating an ordinary scattering pattern of the workpiece; and selectively detecting the defect scatter (by 29 and 87).

Independent claims 1, 4 and 53 characterize the light selection element as being an "array". The element 23 of Danko is an element that is independently controllable at different points across its extent, and thus is an "array" of separately controllable points.

Independent claims 1, 4, 53, and dependent claim 55, claim a processing circuit or step to characterize the workpiece surface or defects thereon. The Danko reference does not appear to explicitly state that the defect image can be analyzed by processing circuitry for this purpose, but the intent, purpose and rational for this type of inspection by detecting defects is for analyzing the selectively detected defect scatter to characterize the workpiece surface at least as acceptable or unacceptable. It is thus at least obvious to use the device for what is clearly its intended purpose of inspection, which requires that the data returned is analyzed to characterize the workpiece surface (claims 1, 4, 53 and 55). Using the processing circuit to identify and categorize the data, as is well known in the art (see above), would have been obvious for the known utility and benefits of doing this identification and categorization.

As in claims 2 and 8, the light selective means 29 of the reference is a reflective array; the various points across are, as constituted in that reference,

reflector elements that are activated to selectively direct the scattered light to the detector.

As in claims 3, 9, 63 and 64 (taking claim 64 to be directed to an "LCD filter array", see the rejection under 35 USC 112 above), the light selective array 29 is a liquid crystal device (column 5, lines 24-26) which, in functional cooperation with a polarizer, selectively filters out the ordinary scattering.

As in claim 6, the system of Danko et al is a darkfield system.

As in claim 10, the CCD detector 27 will have at least two photosensitive elements.

As in claim 54 , the reference also shows detecting the defect scatter by detecting the scattered light (by 107); determining which of the scattered light comprises the ordinary scattering pattern of the workpiece in processor 109); and after identifying the ordinary scattering pattern, selectively excluding the ordinary scattering pattern from detection (by controlling SLM 29), thereby selectively detecting the defect scatter.

As in claim 56, the reference shows detecting the scattered light such that two dimensional images of the scattered light are generated (in 107); wherein determining which of the scattered light comprises the ordinary scattering pattern comprises analyzing the two-dimensional images to determine a spatial light distribution that corresponds to the ordinary scattering pattern of the workpiece (in processor 109); and wherein selectively detecting the defect scatter comprises

selectively detecting scattered light that does not form part of the ordinary scattering pattern of the workpiece (by means of 29 and 87).

As in claim 57 through 60, in the reference determining which of the scattered light comprises the ordinary scattering pattern comprises analyzing the two-dimensional images to determine a spatial light distribution that corresponds to the majority of the light and defining this distribution as the ordinary scattering pattern of the workpiece; see column 6, lines 3-5 and 27-36 wherein it discusses blocking the brightest portions of the image as corresponding to the ordinary scattering (that is, the scattering by the pattern). This treats the majority of the light as defining the ordinary scattering as claimed. The reference does not explicitly state what percentage of the light is in the blocked portion, but the system as describe will block the scattered light corresponding to the ordinary light, and in patterns in which the ordinary scattering is above 80% (claim 58) or above 99% (claim 58), that amount of light will be blocked. It is at least obvious to set up the system to be optimum for its intended purpose (claim 60), it would be foolish to select a suboptimal arrangement.

10. Claims 61 and 62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Danko (US 5,659, 390) in view of Goldberg (US 6,366,352).

See the rejection above of 54 over Danko.

Danko teaches using an array of reflective elements as the light selection array, but not one in which the ordianry light is reflected away.

Goldberg et al, in column 8, line 66 through column 9, line 12, teaches the use of a reflective light selective means, such as a MEMS, in a similar arrangement for the purpose of eliminating ordinary scattered light.

It would have been to use a known reflective light selection means for the light selection array of Danko because, as taught by Goldberg et al, such reflective light selection means are known, known to be useful for such purposes, and known to be usable for such purposes.

11. Claims 5 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over any one of Nakata et al (US 5,046,847), Goldberg et al (US 6,366,352), Vaez-Iravani et al (US 6,201,601) or Danko (US 5,659, 390).

See the rejections of claim 4 and 53, parent claims to claims 5 and 55 respectively, separately over the references above. All the references are directed to detecting defects, but do not appear to explicitly discuss identifying and categorizing the defects. The use of such optical defect detecting arrangements to identify and categorize the defects based upon the scattering by the defects is common practice routine in the art, and is so well known that official notice may be taken. It would have been obvious to perform such identification and categorization

in the systems of Nakata et al and Goldberg et al because this would provide additional information known in the art to be useful.

It is noted that the instant disclosure, while not specifically characterizing this identification and categorization as being known in the prior art, does not disclose any technique for doing so, but merely state it is done. Thus the instant specification in not consistent with adequate disclosure under any understanding in which the identification and categorization techniques are not so well-known in the art that mere mention is sufficient for full disclosure.

12. Claims 11 through 52 are allowable. The art, in particular Danko above, teaches a programmable light selection array (23) positioned to receive light scattered from the workpiece and teaches directing the light from the workpiece onto a photodetector array (107) to produce an electric signal, and teaches circuitry (109) for receiving the electrical signal form the photodetector array and determining which portion of the light scattered from the workpiece comprises the ordinary scattering pattern of the workpiece to control the programmable light selection array. The art does not however teach or suggest, as claimed in independent clams 11 and 38, "the first photodetector array is positioned to receive the light from the programmable light selection array", but rather provides means (beam splitter 99) to obtain the image separately from the light "from the programmable light selection array". Unlike what is claimed in independent claims

11 and 38, the light used in Danko et al to determine the ordinary scattered light and control the light selection means is not directed onto the photodetector array (claim 11) or photodetector element (claim 38) by the light selection element itself.

The cited references above other than Danko, while showing programmable light selection means, do not show detecting and analyzing the scattered light in the system itself to in order to determine the ordinary scattered light and control the light selection means.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard A Rosenberger whose telephone number is (571) 272-2428. The examiner can normally be reached on Monday through Friday during the hours of 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr. can be reached on (571) 272-2800 ext. 77. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

R. A. Rosenberger
7 February 2005

Richard A. Rosenberger
Primary Examiner